

PLEISTOCENE ECHINOIDS (ECHINODERMATA) FROM BERMUDA AND BARBADOS

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Abstract.—Pleistocene fossil echinoids have been neglected compared to more ancient members of this group. Two occurrences of extant species in the Pleistocene are documented herein. *Echinometra lucunter* (Linné) from Bermuda adds to the growing list of fossil occurrences of this species, which has a durable test, but lives in areas of poor preservation potential. *Meoma ventricosa* (Lamarck) from Barbados is the first ‘complete’ specimen of this species from the fossil record.

Pleistocene echinoids have received less attention than those from earlier in the fossil record for a variety of reasons. For example, they are commonly poorly preserved (Gordon & Donovan 1992) and they usually belong to extant species that have already been well-studied by zoologists. The fact that these species are still extant, however, makes Pleistocene echinoids particularly suitable for investigating and testing diverse paleobiological problems and hypotheses. Gordon & Donovan (1992) used disarticulated plates to determine the distribution of echinoids on a Sangamonian (late Pleistocene) raised reef, and Donovan & Gordon (1993) tested taphonomic predictions made on the basis of living species (Greenstein 1991) against the same taxa that occurred in the Plio-Pleistocene of the Caribbean region.

The present paper records the occurrence of moderately well-preserved echinoid tests from the Pleistocene deposits of Bermuda and Barbados. The Pleistocene echinoid faunas of both islands are essentially unknown and it is hoped that the present communication may stimulate further research.

The echinoid classification used herein follows Smith (1984). Terminology of the echinoid test follows Melville & Durham (1966) and Smith (1984). Specimens described herein are deposited in the Field

Museum of Natural History, Chicago (FMNH), and the University of Alberta (UA).

Class Echinoidea Leske
Superorder Camarodonta Jackson
Order Echinoida Claus
Family Echinometridae Gray
Genus *Echinometra* Gray
Echinometra lucunter (Linné, 1758)
Fig. 1

Material, locality and horizon.—A single test, FMNH PE 309, from Bermuda. The specimen label states “Echinometrid echinoid (labeled *Echinometra lucunter*). “*Cladocora* rock”—Quaternary [presumably Pleistocene]. Bermuda. Gift of Bermuda Biological Station, 1947”. Quaternary deposits of Bermuda have been deposited over the past 250,000 years (Harmon et al. 1983).

Preservation.—The test (Fig. 1) is preserved in a well-indurated white limestone. Fragments of *Cladocora* are apparent in limestone adhering to the outside of the test. The Aristotle’s lantern and part of the test (approximately coinciding with interambulacrum I and ambulacrum II) are missing, and more of the test is concealed by limestone (Fig. 1a). The apical region is poorly preserved and the apical system is

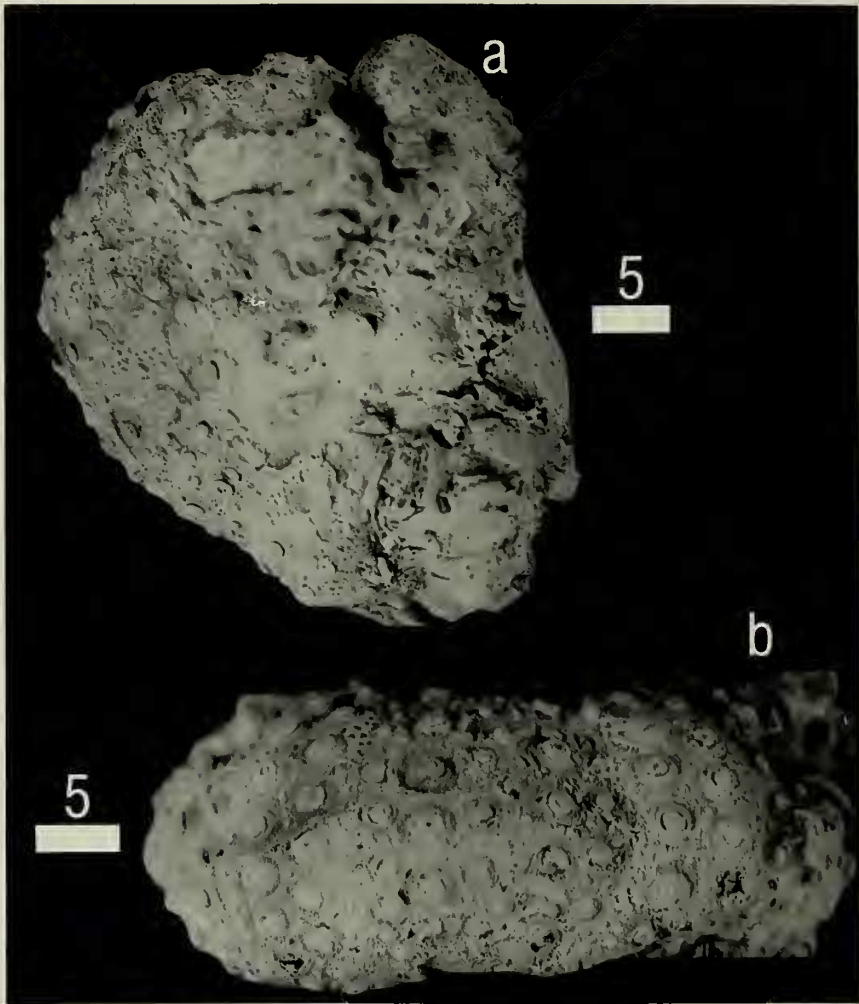


Fig. 1. *Echinometra lucunter* (Linné, 1758), FMNH PE 309. a, apical view. b, lateral view. Scale bars in mm.

missing (Fig. 1a). Parts of the test are broken and crushed, commonly across plates. Although in other regular echinoids this might mean that death was caused by predation (Smith 1984:19), the plates of extant *E. lucunter* are so well interlocked by stereom trabeculae that this breakage, associated with an essentially 'complete' test, was probably post-burial. This specimen appears to fall into disintegration state 5 of Kidwell & Baumiller (1990:249).

Description.—For a recent description of *E. lucunter*, see Donovan (1993).

Remarks.—At present, *E. lucunter* ranges from Florida to Brazil and off the west coast of Africa (Kier 1992). In particular, it occurs on hard substrates in high energy environments around Bermuda (D. L. Pawson, pers. comm.). Previously, *E. lucunter* has been reported from the Plio-Pleistocene of Jamaica, the Dominican Republic, Florida, and Angola (Gordon 1991, Kier 1992; note that in the former reference 'Dominica' in table 1 should read Dominican Republic). It is also reported from the 'middle' Oligocene (Larue 1994) San Sebastian For-

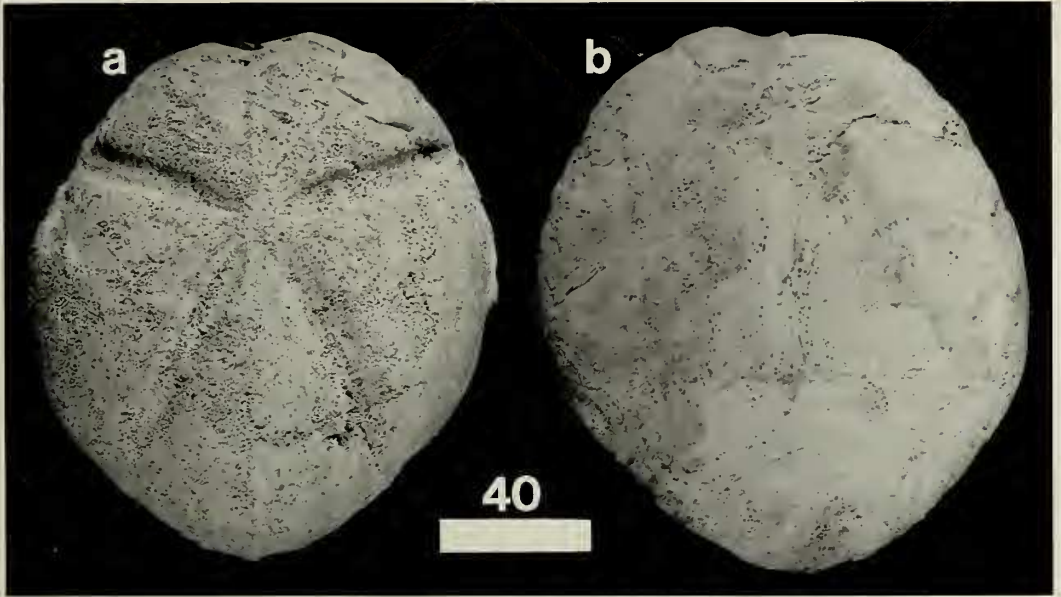


Fig. 2. *Meoma ventricosa* (Lamarck, 1816), UA 9496. a, apical view, b, oral view. Scale bar in mm.

mation of Puerto Rico (Gordon 1963), but this could be a misidentification of *E. prisca* Cotteau which is abundant at about the same level in Antigua (Poddubiuk & Rose 1985: table 1). However, this possibility was discussed by Gordon (1963:632, 635), who noted that the pore pairs of the Puerto Rico specimens are mainly arranged in arcs of six as in *E. lucunter*, but dissimilar to *E. prisca*.

The Bermudan specimen adds to the growing data base of occurrences of fossil *E. lucunter* (Donovan & Gordon 1993). Although this taxon has a high potential for preservation when compared with other regular echinoids (Greenstein 1991), Gordon (1991) noted that *Echinometra* has a poor fossil record as complete tests. This is presumably due to the preferred life habit of this taxon, on hard substrates under high energy conditions, which is usually removed from environments of sedimentary deposition (Smith 1984:22). In consequence, fossil *E. lucunter* is rarely found as 'complete' tests in Pleistocene deposits (Donovan & Gordon 1993), although *Echinometra* may be locally abundant as dis-

articulated plates (Gordon & Donovan 1992).

Superorder Microstomata Smith
 Order Spatangoida Claus
 Family Micrasteridae Lambert
 Genus *Meoma* Gray
Meoma ventricosa (Lamarck, 1816)
 Fig. 2

Material, locality and horizon.—A single test, UA 9496, from the Arawak Cement Quarry, northwest Barbados. The specimen came from a large boulder lying on the quarry floor. This test was preserved in moderately lithified grainstone, about 125,000 years old (Upper Pleistocene, Sangamonian; last interglacial), that accumulated in pockets between large *Montastrea annularis* colonies that are the main component of the reef at this locality.

Preservation.—This specimen is preserved largely as an internal mold, although test calcite is retained over about half of the oral surface and in part of interambulacrum 2 apically (Fig. 2). A patchy, calcareous ve-

neer occurs over much of the internal mold that may be a remnant of the test, although individual plates are not discernable, perhaps suggesting it is possibly diagenetic in origin. The mold is composed of lithified carbonate sand. This specimen is particularly noteworthy because of its large size, about 160 mm long by 135 mm wide by 65 mm high. Although not unusual for this species, few Caribbean fossil echinoids of comparable dimensions are known.

Description.—For a comprehensive description of this species, see Chesher 1970; see also Kier & Grant 1965, Chesher 1969, and Kier 1975.

Remarks.—The only fossil echinoids previously documented from Barbados are from the Tertiary clastic sedimentary rocks exposed in the northeast of the island (Kier 1966). Kier (1966:2) commented that “It is rather surprising, considering the large numbers of echinoids known from Eocene rocks in the Caribbean . . . that . . . species from the Upper Scotland Formation are quite distinct.” These rocks were previously thought to be shallow-water in origin (see, for example, Barker & McFarlane 1980). However, it is now generally recognized that siliciclastic and other rocks of northeast Barbados were of deep-water origin (Speed 1988). Eocene echinoids described from the Caribbean tend to be preserved in limestones of shallow-water origin, hence the differences between faunas. In Barbados, only the Pleistocene limestones were truly deposited in shallow-water.

Extant *Meoma ventricosa* is a sand-burrowing spatangoid found in the Caribbean, Florida, the Bahamas and the Pacific coast of Panama (Chesher 1969, 1970). It still occurs in sandy reef environments similar to that interpreted for the Pleistocene locality in Barbados (for example, the lagoon at east Discovery Bay, north Jamaica; SKD, personal observation). However, it is poorly represented in the fossil record and only appears to have been reported previously from

the Upper Pleistocene of Jamaica (Donovan et al. 1994), based on test fragments.

Two subspecies of this taxon were recognized by Chesher (1970), *M. v. ventricosa* (Lamarck) and *M. v. grandis* Gray. Distinguishing between these two subspecies relies on features of the test that are not preserved in the Barbadian specimen. This test is unusually broad and could, very tentatively, be referred to *M. v. grandis*, which was originally described from the Pacific coast of Panama. If this provisional identification is correct, then either a contraction of range since the late Pleistocene or an ecophenotypic, rather than genetic, explanation for the two test morphologies in this species is indicated. However, Kier & Grant (1965: pl. 9, fig. 4) illustrated a test of *M. v. ventricosa* of comparable gross morphology to the specimen from Barbados.

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